

WASHINGTON DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
FRESHWATER MONITORING UNIT
STREAM DISCHARGE TECHNICAL NOTES

STATION ID: 19C060
STATION NAME: West Twin River
WATER YEAR: 2008
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Introduction

Watershed Description

The West Twin River station is a stand-alone, continuously recording gaging station that has been operating since June 2004 in Water Resource Inventory Area (WRIA) 19. Like the other two drainages within the Strait of Juan de Fuca complex (East Twin River and Deep Creek) , West Twin River is very dynamic and carries substantial loads of bed material and large woody debris during precipitation--driven storm events which typically occur from November through February. The basin geology is composed of Crescent Formation volcanic rock in the upper watershed, marine sedimentary rock in the lower watershed, and terraces of glacial deposits in the lower floodplain (ONF 2002).

Gage Location

The gaging station is located in Clallam County, Washington approximately 20 miles west of Port Angeles. The station is on the left bank approximately 0.2 miles upstream from the mouth.

Table 1. Basin Area and Legal Description

Drainage Area (square miles)	12.7
Latitude (degrees, minutes, seconds)	48 09 47
Longitude (degrees, minutes, seconds)	123 57 10

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	43
Median Annual Discharge (cfs)	30
Maximum Daily Mean Discharge (cfs)	258
Minimum Daily Mean Discharge (cfs)	3.5
Maximum Instantaneous Discharge (cfs)	313
Minimum Instantaneous Discharge (cfs)	3.4
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	111
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	4.6
Number of Days Discharge is Greater Than Range of Ratings	4
Number of Days Discharge is Less Than Range of Ratings	0
Number of Un-Reported Days	4
Number of Days Qualified as Estimates	9
Number of Modeled Days	0

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

Table 2 Discussion (Discharge Statistics)

Four total days were not factored into the discharge statistics reported in Table 2. These 4 days were some of the highest discharge values recorded during the water year, so actual values were higher than those reported in the table. WY2008 was a relatively mild year in terms of discharge for the West Twin River. The largest event of the year was a rapidly moving storm that swept through the Olympic Peninsula on December 3 and 4, 2007. Relatively early, small to moderate events in October and November 2007 may have assisted adult salmonid upstream escapement. After the large event in early December, a series of mostly small events marked the remainder of the year. A small, somewhat unusual precipitation event in late August and another smaller event in late September mitigated summer base flows.

Table 3. Error Analysis Summary.

Potential Logger Drift Error (% of discharge)	3.6
Potential Weighted Rating Error (% of discharge)	7.0
Total Potential Error (% of discharge)	10.6

Table 3 Discussion (Error Analysis)

Total Potential Error (TPE) is the cumulative value of the potential logger drift error and the potential weighed rating error. Error surrounding any predicted discharge value is acquired in a number of ways, ranging from variability in the quality of any particular discrete discharge measurement to the operational performance of a datalogger and the sonde measuring stage. Total Potential Error defines the expected range for any predicted discharge value. For example, if the TPE is 10.0 % and the predicted discharge value is 100 cfs, the range in which the actual predicted value lies is 90 to 110 cfs. For 211 of the recorded days, the agreement between the stage on the logger and discrete observations of the primary gage index met standards defining stable drift. Nine days were quality coded as estimated due to logger drift error exceedances.

Table 4. Stage Record Summary

Minimum Recorded Stage (feet)	2.11
Maximum Recorded Stage (feet)	7.42
Range of Recorded Stage (feet)	5.31

Table 4 Discussion (Stage Record)

Two gaps in the stage record due to power supply failures were filled using regressed stage data from nearby gaging stations. During all of WY2008, discrepancies between the observed value of the primary gage index and the logged stage value were reconciled by automated adjustment of the stage record using the data shift function. The maximum stage value was recorded on December 3, 2007. The minimum stage value was recorded on September 17, 2008.

Table 5. Rating Table Summary

Rating Table No.	501	7	
Period of Ratings	10/01-12/05	12/03-09/30	
Range of Ratings (cfs)	2.2-338	1.7-338	
No. of Defining Measurements	4	7	
Rating Error (%)	6.1	7.2	

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Table 5 Discussion (Rating Tables)

Somewhat surprisingly, only two ratings were required to predict discharge for the entire water year. Given the dynamic nature of the West Twin River channel, the relative absence of rating shifts due to changes of the hydraulic control is a fairly strong indicator of the benign hydrologic conditions during WY2008. Other than the relatively large but fast moving event in early December, WY2008 was mild and mostly dry.

Table 6. Model Summary

Model Type (Slope conveyance, other, none)	none
Range of Modeled Stage (feet)	
Range of Modeled Discharge (cfs)	
Valid Period for Model	
Model Confidence	

Table 6 Discussion (Modeled Data)

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Table 7. Survey Type and Date (station, cross section, longitudinal)

Type	Date
Station	10/08/2008

Table 7 Discussion (Surveys)

Clishe and Shedd conducted a station survey establishing primary gage index relative elevations of bench and laser level reference marks.

Activities Completed

Laser level infrasture installed. Station power supply consolidated and re-designed. Solar power recharge system augmented.